UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,391	02/12/2004	Robert M. France	1014-076US01/JNP-0326	5773

72689 7590 01/07/2009

SHUMAKER & SIEFFERT, P.A
1625 RADIO DRIVE , SUITE 300
WOODBURY, MN 55125

EXAMINER	
LAI, ANDREW	

ART UNIT	PAPER NUMBER
2416	

NOTIFICATION DATE	DELIVERY MODE
01/07/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pairdocketing@ssiplaw.com

Office Action Summary	Application No.	Applicant(s)	
	10/777,391	FRANCE, ROBERT M.	
	Examiner	Art Unit	
	ANDREW LAI	2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37 and 39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37 and 39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Examiner's Notes

In responding to Examiners Final Rejection of 7/23/2008, Applicant filed an RCE on 10/23/2008 with amendments mainly to the various Independent claims and a newly added dependent claim. This Office Action will address all of the claims, new, amended as well as previously presented with a focus on newly added features to the Independent claims. In the "Response to Argument" section, issues raised in Applicant's Remarks, as part of the RCE, will be addressed as well.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-23 and 25-37 and 39 rejected under 35 U.S.C. 103(a) as being unpatentable over Kuhl et at (US 2003/0118026, Kuhl hereinafter) in view of Callon et al (US 5,251,205, Callon hereinafter) and further in view of Raychaudhuri et al (US 5,684,791, Raychaudhuri hereinafter).

Kuhl discloses "system and method for mapping quality of service levels between MPLS and ATM connections in a network element" (p1 left col. lines 1-3) performing "mapping of ATM quality of service to a [internal] class of service" ([0063]) and then "mapping of [internal] class of service and drop precedence to [MPLS] EXP value" ([0069]) wherein "the class of service assigned to a connection is determined by the value of its ATM QoS parameters" ([0064] lines 5-6). Kuhl's invention comprises:

- **With respect to Independent claims 1, 15, 26, 29 and 34**

  Regarding claim 1, *a method* ("method" cited above) *comprising:*

receiving, with a network device (fig. 2 "ATM/MPLS edge switch 122" or fig. 6 "ATM/IP edge switch 122". For convenience of later discussion, they are both denoted hereinafter as "A/M 122") *that supports at least* two *network protocols* (above cited "ATM" and "MPLS". It should be noted that, although not explicitly/expressly, Kuhl implicitly suggests *support three network protocols*, i.e. a third "IP" protocol, as fig. 6 denoted an "ATM/IP edge switch 122"), *a packet* (fig. 6 ATM "cell 620") on a connection ("ATM connection", [0049] line 1) *containing a first CoS information* ("ATM service categories", [0049] line 3, obtained via a "connection message 606", fig. 6, which "contains the ATM QoS parameters for the connection including its ATM service category", [0067] lines 6-8, and "an ATM connection may belong to a particular service category", [0049] lines 5-6, for which [0050] – [0054] give examples of *CoS,* e.g., "CBR", "rt-VBR", "nrt-VBR", "ABR", and "UBR", listed under fig. 5 "service category 502"), *wherein the first CoS information* ("CBR/VBR/ABR/UBR" etc.) *specifies a class of service for the packet* (see [0050] – [0054] again which *specifies class of service*, for example, "CBR category is provide to real-time data transmission, e.g. video, requiring a fixed amount of bandwidth provided at regular intervals", [0050] lines 1-4, and for another example, "ABR (Available Bit Rate) - connections in this category require a low CLR but can tolerate a high CDV", [0053] lines 1-3) *in a format conforms to a first of the at least* two *supported network protocols used within a network* ("CBR/VBR/ABR/UBR" *conforms to* "ATM" as well known in the art);

storing, within the network device ("A/M 122"), *intermediate CoS information* (figs. 5/7 "class of service 508/702" *stored* in "mapping 600/614" of fig. 6, wherein

"mapping 600 is that provided in table 500 fig. 5", [0066] lines 6-7, and "mapping 614 may be that provided in table 700 of fig. 7", [0072] lines 8-9) *that provides a universal classification mechanism independent of: (i) any layer two protocols used within the network, and (ii) protocols of layers on top of layer two protocols used within the network* (figs. 5/7 each showing *a universal classification mechanism* comprising "class of service" values of 1-8, *independent* of ATM, *layer two*, or MPLS, *layer on top of layer two*, which Kuhl's ATM cells eventually destine to);

accessing the first class of service information (fig. 5 "service category 502") *within the packet* ("ATM cell") connection ("ATM connection" cited above that carries "ATM cells") *to determine the class of service for the packet* (fig. 5 again showing "service category 502" having "CBR/VBR/ABR/UBR" *classes of service for* ATM ells);

mapping the first CoS information ("service category 502" cited above) *to the intermediate CoS information* ("class of service 508", and fig. 5 shows the *mapping* of "service category 502" *to* "class of service 508") *based on the class of service determined for the packet* (see, for general, "first stage maps the ATM QoS parameters to a class of service", [0030] lines 11-12, and see, for detail, fig. 5 showing "mapping 600" for *mapping* "CBR" → "CoS 1", "VBR" → "CoS 1-6" depending further on "CLR/CDV", "ABR" → "CoS 7" and "UBR" → "CoS 8", done by "control complex 244 [fig. 6 – Examiner notes] maps the ATM QoS parameters to the class of service using mapping 600", [0068] lines 7-8);

mapping the intermediate CoS information (fig. 7 "class of service 702", same as fig. 5 "class of service 508") *to a second CoS information* ("EXP field" and see "MPLS

QoS is provided for a connection in a MPLS network by providing a value to an experimental (EXP) field for the outer label of a MPLS frame", [0030] lines 6-8, and see, for general, "second stage utilizes the class of service for the connection ... to generate an appropriate EXP value. This value is inserted in the EXP field in the outer label of a MPLS frame", [0030] lines 13-17, and see, for detail, fig. 7, showing "mapping 614" for *mapping* "CoS 1-8", together with "CLP=0/1", to "EXP value 0-7" in columns 704/706, done by "MPLS card 204 of ATM/MPLS edge switch 122 maps the class of service ... to a value for EXP field 632", [0070] lines 3-6), *wherein the second CoS information* ("EXP values") *specifies the class of service for the packet in a format that conforms to a second of the at least* two *supported network protocols* ("MPLS protocol" as the *second* protocol while "ATM protocol" cited above as the *first*) *used within the network* (again "MPLS card 204 of A/M 122 maps the class of service ... to a value for EXP field 632", [0070] lines 2-4, noting that "EXP" in MPLS frame is well-known to *specify the CoS information* of a MPLS frame *conforming to* the MPLS *protocol*); *and*

outputting the packet with the network device to forward the packet within the network in accordance with the second network protocol ("MPLS card 204 inserts the appropriate value into EXP field 632 of each outgoing MPLS frame 630 and transmits them over the E-LSP, LDP 686, of MPLS network 104", [0070] lines 6-8), *the packet* ("MPLS frame 630") *containing the second CoS information that specifies the class of service information for the packet* (again "MPLS card 204 inserts the appropriate value into EXP field 632 of each outgoing MPLS frame 630 and transmits them over the E-LSP, LDP 686, of MPLS network 104", [0070] lines 6-8, which, "for example, an internal

cell 650 with CLP bit 652 equal to '0' belonging to a connection with class of service 7 (row 722, column 704) will have the value 6, '110' in binary, inserted into EXP field 632 of MPLS frame 630", [0071] lines 5-9) *in accordance the second network protocol* ("MPLS frame" must be *in accordance* with the MPLS *network protocol*).

Regarding claim 15, *a system* (fig. 6 showing "A/M 122") *that supports at least* two *network protocols* ("ATM" and "MPLS" cited above, and it should be noted that, although not explicitly/expressly, Kuhl implicitly suggested *three network protocols*, i.e. a third "IP", as fig. 6 denoted an "ATM/IP edge switch 122) *comprising:*

a first interface (fig. 6 "ATM card 200") *to receive a packet* (ATM "cell 620") on a connection ("ATM connection", [0049] line 1) *containing data including a first class of service (CoS) information* ("ATM service categories", [0049] line 3, obtained via a "connection message 606", fig. 6, which "contains the ATM QoS parameters for the connection including its ATM service category", [0067] lines 6-8, and "an ATM connection may belong to a particular service category", [0049] lines 5-6, for which [0050] – [0054] give various examples of *CoS*, e.g., "CBR", "rt-VBR", "nrt-VBR", "ABR", and "UBR" listed also in fig. 5 under "service category 502") *that conforms to a first one of the at least* two *network protocols* ("CBR/VBR/ABR/UBR" *conforms to* "ATM"), *access the data of the packet* connection (fig. 5 "service category 502" for "ATM connection" cited above that carries ATM cells) *to determine the class of service for the packet* (fig. 5 again showing "service category 502" having "CBR/VBR/ABR/UBR" etc. *classes of service for* ATM cells), *and map the first CoS information* ("service category 502") *to the intermediate CoS information* ("class of service 508" in fig. 5) *based on the class of*

service determined for the packet (see, for general, "first stage maps the ATM QoS parameters to a class of service", [0030] lines 11-12, and see, for detail, fig. 5 showing "mapping 600" that *maps* "CBR" → "CoS 1", "VBR" → "CoS 1-6" depending further on "CLR/CDV", "ABR" → "CoS 7" and "UBR" → "CoS 8", done by "control complex 244 [fig. 6 – Examiner notes] maps the ATM QoS parameters to the class of service using mapping 600", [0068] lines 7-8) *by updating the data of the packet* ("ATM cell 300 is converted into internal cell 350 by the addition of internal header 352", [0044] lines 8-9), *wherein the intermediate CoS information* ("class of service") *provides a universal classification mechanism independent of any layer two protocols and protocols of layers on top of layer two protocols used by the network device* (refer to figs. 5/7, each showing *a universal classification mechanism* comprising eight different "class of service" values, *independent* of ATM, *layer two*, or MPLS, *layer on top of layer two*, which Kuhl's ATM cells eventually destine to); *and*

a second interface (fig. 6 "MPLS card 204") *to map the intermediate CoS information* (fig. 7 "class of service 702", the same as fig. 5 "class of service 508") *to a second CoS information* ("EXP field" where "MPLS QoS is provided for a connection in a MPLS network by providing a value to an experimental (EXP) field for the outer label of a MPLS frame", [0030] lines 6-8, and see, for general, "second stage utilizes the class of service for the connection ... to generate an appropriate EXP value. This value is inserted in the EXP field in the outer label of a MPLS frame", [0030] lines 13-17, and, for detail, fig. 7, showing "mapping 614" that *maps* "CoS 1-8", together with "CLP=0/1", to various "EXP value 0-7" in columns 704/706", done by "MPLS card 204 of

ATM/MPLS edge switch 122 maps the class of service ... to a value for EXP field 632", [0070] lines 3-6) *that conforms to a second one of the at least* two *supported network protocols* ("MPLS protocol" as the *second* protocol while "ATM protocol" cited above as the *first*, and "EXP field" *conforms to* "MPLS" as well known).

Regarding claim 26, *a network device* (fig. 6 "A/M 122") *that supports at least* two *network protocols* ("ATM" and "MPLS" cited above, and it should be noted that, although not explicitly/expressly, Kuhl implicitly suggested *three network protocols*, i.e. a third "IP", as fig. 6 denoted an "ATM/IP edge switch 122") *comprising:*

a control unit ("control complex 214") *that:*

stores intermediate CoS information (figs. 5/7 "class of service 508/702" *stored* as "mapping 600/614" of fig. 6 in "control complex 214", which "mapping 600 is that provided in table 500 fig. 5", [0066] lines 6-7, and "mapping 614 may be that provided in table 700 of fig. 7", [0072] lines 8-9) *that provides a universal classification mechanism independent of any layer two protocols and protocols of layers on top of layer two protocols used by the network device* (refer to figs. 5/7, each showing *a universal classification mechanism* comprising 1-8 different "class of service" values, *independent* of ATM, *layer two*, or MPLS, *layer on top of layer two*, which Kuhl's ATM cells eventually destine to);

associate the internal CoS information ("class of service" cited above) *with a packet* ("ATM cell") connection ("ATM connection" that carries "ATM cells") *based on data within the packet* connection *that defines first QoS information* ("ATM service categories", [0049] line 3, obtained via a "connection message 606", fig. 6, which

"contains the ATM QoS parameters for the connection including its ATM service category", [0067] lines 6-8, and "An ATM connection may belong to a particular service category", [0049] lines 5-6, which is listed in fig. 5 under "service category 502", and see further, for general, "first stage maps the ATM QoS parameters to a class of service", [0030] lines 11-12, and see, for detail, fig. 5 showing "mapping 600" that *associates* "CBR" → "CoS 1", "VBR" → "CoS 1-6" depending further on "CLR/CDV", "ABR" → "CoS 7" and "UBR" → "CoS 8" by "control complex 244 maps the ATM QoS parameters to the class of service using mapping 600", [0068] lines 7-8) *wherein the first CoS information conforms with a first one of the at least* two *network protocols* (well known in the art that "CBR/VBR/ABR/UBR" *conforms to* "ATM"); *and*

maps the associated intermediate CoS information ("class of service 702" of fig. 7) *to second CoS information* (fig. 6 MPLS "EXP field 632", [0070] line 2, which is shown in fig. 7 having different values in columns 704/706 for "CLP = 0/1" for different "class of service" values in column 702, and see further, for general, "second stage utilizes the class of service for the connection ... to generate an appropriate EXP value. This value is inserted in the EXP field in the outer label of a MPLS frame", [0030] lines 13-17, and see, for detail, fig. 7, showing "mapping 614" that *maps* "CoS 1-8", together with "CLP=0/1", to various "EXP value 0-7" in columns 704/706, done by "MPLS card 204 of ATM/MPLS edge switch 122 maps the class of service ... to a value for EXP field 632", [0070] lines 3-6), *wherein the second CoS information conforms to a second one of the at least* two *network protocols* ("EXP field" is well known in the art to be a field in MPLS frames which *conforms to* the MPLS *network protocol*).

Regarding claim 29, *a computer-readable medium storing a computer program* ("a system and method of translating a set of transmission parameters related to a first transmission protocol from said first transmission protocol to a second transmission protocol for a data element being sent", Abstract lines 1-4) *that comprises instruction to cause a processor* ("A/M 122", fig. 2) *to* (the following operations disclosed by Huhl will have to be *caused* by *a computer-readable medium storing a computer program* with *instruction*) *to:*

receive, with a network device (fig. 2 "ATM/MPLS edge switch 122", which is also shown in fig. 6 as an "ATM/IP edge switch 122") *that supports at least* two *network protocols* ("ATM" and "MPLS" cited above, and it should be noted that, although not explicitly/expressly, Kuhl implicitly suggested *three network protocols*, i.e. a third "IP", as fig. 6 denoted an "ATM/IP edge switch 122"), *a packet* (ATM "cell 620") on a connection ("ATM connection", [0049] line 1) *having data including a first class of service (CoS) information* ("ATM service categories", [0049] line 3, obtained via a "connection message 606", fig. 6, which "contains the ATM QoS parameters for the connection including its ATM service category", [0067] lines 6-8, and "An ATM connection may belong to a particular service category", [0049] lines 5-6, for which [0050] – [0054] give various examples of *CoS*, e.g., "CBR", "rt-VBR", "nrt-VBR", "ABR", and "UBR", which are also listed in fig. 5 as "service category 502"), *wherein the first CoS information conforms to one of the at least* two *network protocols* ("CBR/VBR/ABR/UBR" *conforms to* "ATM" as well known);

store intermediate CoS information (figs. 5/7 "class of service 508/702" *stored* in "mapping 600/614" of fig. 6, wherein "mapping 600 is that provided in table 500 fig. 5", [0066] lines 6-7, and "mapping 614 may be that provided in table 700 of fig. 7", [0072] lines 8-9) *that provides a universal classification mechanism independent of any layer two protocols and protocols of layers on top of layer two protocols used by a network device* (refer to figs. 5/7, each showing *a universal classification mechanism* comprising eight different "class of service" values, *independent* of ATM, *layer two*, or MPLS, *layer on top of layer two*, which Kuhl's ATM cells eventually destine to);

access the data of the packet connection ("ATM connection" cited above carrying "ATM cells") *to determine the first CoS information* (fig. 5 "service category 502" having "CBR/VBR/ABR/UBR" etc. which determine *classes of service for the* "ATM cells" thereon); *and*

process, based on the first CoS information determined for the packet (see [0050] – [0054] again which *bases CoS information*, for example, on "CBR category is provide to real-time data transmission, e.g. video, requiring a fixed amount of bandwidth provided at regular intervals", [0050] lines 1-4, and for another example, on "ABR (Available Bit Rate) - connections in this category require a low CLR but can tolerate a high CDV", [0053] lines 1-3), *the data of the packet* (ATM "cell 620") *to include the intermediate CoS* ("class of service" cited above, and see, for general, "first stage maps the ATM QoS parameters to a class of service", [0030] lines 11-12, and see, for detail, fig. 5 showing "mapping 600" for *mapping* "CBR" → "CoS 1", "VBR" → "CoS 1-6" depending further on "CLR/CDV", "ABR" → "CoS 7" and "UBR" → "CoS 8", done by

"control complex 244 maps the ATM QoS parameters to the class of service using mapping 600", [0068] lines 7-8), *wherein the intermediate CoS information* (again "class of service" cited above appearing both in figs. 5/7 as "mapping 600/614" of fig. 6) *is used for mapping the first CoS information to a second CoS information* ("EXP field" and see "MPLS QoS is provided for a connection in a MPLS network by providing a value to an experimental (EXP) file for the outer label of a MPLS frame", [0030] lines 6-8, and see further, for general, "second stage utilizes the class of service for he connection ... to generate an appropriate EXP value. This value is inserted in the EXP field in the outer label of a MPLS frame", [0030] lines 13-17, and see, for detail, fig. 7, showing "mapping 614" for *mapping* "CoS 1-8", together with "CLP=0/1", to various "EXP value 0-7" in columns 704/706, done by "MPLS card 204 of ATM/MPLS edge switch 122 maps the class of service ... to a value for EXP field 632", [0070] lines 3-6) *that conforms to a second network protocol* ("MPLS/ATM protocol" as the *second/first protocol*) *by updating the data of the packet* ("MPLS card 204 forms a MPLS frame 630 from one or more internal cells 650, as described above, and insets the appropriate value for EXP field 632 into outer label 634", [0077] lines 4-7).

Regarding claim 34, *a method* ("method for mapping quality of service levels between MPLS and ATM", Title) *comprising:*

processing a packet (fig. 6 incoming ATM "cell 620", which is equivalent to "ATM cell 300" in fig. 3) *with a first interface* (fig. 6 "ATM card 200") *of a network device* (fig. 6 "A/M 122") *that supports at least* two *network protocols* ("ATM" and "MPLS" cited above, and it should be noted that, although not explicitly/expressly, Kuhl implicitly suggested

support three network protocols, i.e. "ATM", "MPLS" and "IP" as fig. 6 denoted an "ATM/IP edge switch 122" and fig. 2 an "ATM/MPLS edge switch 122") *to access data within the packet* (refer to fig. 3 and see "ATM cell 300" shown in fig. 6 being received and having various *data* fields to be *accessed*) *by determining one of the at least* two *network protocols* (again "ATM" protocol as opposed to "MPLS") *by which the packet is received* ("ATM cell 300" *is received by* "ATM" *protocol*) *and applying one of a plurality of policies* ("mapping 600" of fig. 6, which defines *policy* for an "ATM" → "internal cell" mapping, see, for general, "first stage maps the ATM QoS parameters to a class of service", [0030] lines 11-12, and see, for detail, fig. 5 showing "mapping 600" as a *policy* for conversion of "CBR" → "CoS 1", "VBR" → "CoS 1-6" depending further on "CLR/CDV", "ABR" → "CoS 7" and "UBR" → "CoS 8", done by "control complex 244 [fig. 6 – Examiner notes] maps the ATM QoS parameters to the class of service using mapping 600", [0068] lines 7-8, wherein the "CBR/VBR/ABR/UBR" is obtained via a "connection message 606", fig. 6, which "is received at ATM/MPLS edge switch 122 at control complex 214, requesting a new connection through ATM/MPLS edge switch 122, ... Message 606 contains the ATM QoS parameters for the connection including its ATM service category", [0067] lines 3-8) *that corresponds to the determined one of the at least* two *network protocols* (said "mapping 600" or *policy* particularly *corresponds to* the "ATM" *protocol* because said "CBR/VBR/ABR/UBR" QoS of "service category 502" are all ATM specific) *to generate metadata* (again, as shown in fig. 5, *metadata* "CoS 1-8" are generated per "service categories" of "CBR/VBR/ABR/UBR" etc.);

associating the packet with the metadata (see again "control complex 244 maps the ATM QoS parameters to the class of service using mapping 600", [0068] lines 7-8, which "mapping 600" as shown in fig. 5 is *associating* ATM cells of different "service category" *with the metadata* comprising "CoS" values of 1-8), *wherein the metadata defines protocol-independent class of service (CoS) information* (see figs. 5/7 "class of service 508/702" is shown to be *independent of* "ATM" or "MPLS"), *and wherein the protocol-independent CoS information* ("class of service 508/702" having eight different values) *provides a universal classification mechanism and is independent of any layer two protocols* ("ATM protocol") *and protocols of layers on top of layer two* ("MPLS" protocol, and refer to figs. 5/7, each showing *a universal classification mechanism* comprising 1-8 different "class of service" values, *independent* of ATM, *layer two*, or MPLS, *layer on top of layer two*, which Kuhl's ATM cells eventually destine to) *used by the network device* (again "A/M 122", as shown in fig. 6, converting "ATM cell 620" to "MPLS frame 630") *to forward packet within a network* (fig. 6 showing received "ATM cell 620" being *forwarded* to MPLS network 104 as "MPLS frame 630"); *and*

subsequently processing the packet with a second interface (fig. 6 "MPLS card 204") *of the network device* ("A/M 122", and "MPLS card 204 forms a MPLS frame 630 from one or more internal cells 650", [0077] lines 4-5, noting that said "internal cell 650" is a converted ingress "ATM cell 620" that carries original "CLP 622" which in turn is converted to an internal "CLP 652") *in accordance with the protocol-independent CoS information* (fig. 7 "class of service 702" having 1-8 levels together with "CLP = 0/1" being mapped to different "EXP values" in columns 704/706).

Having discussed Kuhl with respect to all of the Independent claims above, it is noted that, while implicitly suggesting support more than two network protocols (figs. 2 and 6 showing "ATM/MPLS" and "ATM/IP" "edge switch 122", and thus supporting "ATM", "MPLS" and "IP"), Kuhl does not expressly discloses, regarding all claims above, that the method/device/system supports at least *three* network protocols.

However, having a method/device/system to support at least *three* (or more) network protocols has been an old and well known technique in the art. One such example can be seen in Callon, who disclosed "multiple protocol routing" (Title), using, in general, "router that is fluent in more than one of the supported protocols supported by the multi-protocol network" (col. 6 lines 31-32) including, for example, "IP" protocol wherein "the IP TOS [type of service – Examiner notes] is mapped into four QoS metrics" (col. 46 lines 11-12), e.g., "TOS" of "100/010/001" mapped to "QOS metric" of "delay/throughput/reliability" (col. 46 lines 18-20). Callon's invention comprises:

Regarding claims 1, 15, 16, 29 and 34, *supporting/supports at least three network protocols* (refer to fig. 7B, which "illustrates a three-protocol network having an all-protocol router", col. 5 last two lines, shown in fig. 7B as "three P3-IP-OSI router 322", *supporting three network protocols* comprising "OSI", "P3" and "IP", and see fig. 11 for "a flow diagram of the user data packet forwarding algorithm to be followed by the all-protocol router of fig. 7B", col. 6 lines 22-24, wherein protocol checking/mapping is performed by adding, if necessary, one of the three protocol headers for forwarding said original "user data packet" appropriately).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kuhl by adding Callon's expressly taught "multi-protocol" device/mechanism, with an "at least three" multiplicity, in order to provide a more widely applicable device able "to coherently provide complete communication capabilities" (Callon, col. 2 lines 29-30) as well as "is capable of acting as a router to recognize and forward user data packets which conform to a first protocol suite and is capable of acting as a bridge to recognize and forward user data packets which conform to at least a second protocol suite" (Callon, col. 5 lines 14-18, emphasis added by Examiner).

Having discussed Kuhl in view of Callon, it is herein reviewed that Kuhl disclosed receiving *first CoS information* (ATM "service category") *for a packet* ("ATM cell") via a separate message ("connection message 606", fig. 6) for the connection the "ATM cell" is received thereon. In other words, Kuhl in view of Callon does not expressly disclose, regarding all claims above, receiving an ATM cell with embedded ATM "service category" in the header of the ATM cell.

It should be noted though that Kuhl does disclose embedding data that has functions of "service category" in the ATM cell and using such in QoS mapping. It is shown in fig. 3 in receiving "ATM cell 300", having an embedded "CLP bit 305" that is mapped to "CLP bit 355" of an "internal cell 350" and finally embedded in "header 316" of "MPLS frame 312", which embedded "CLP" in "header 316" is used, together with "class of service 702" of fig. 7, for mapping the "MPLS frame 312" with an embedded "EXP field 322" value as shown in fig. 7 (see also [0043] – [0045] for details of such mapping wherein "CLP bit 305 indicates the drop precedence value of that particular cell 300 i.e. whether cell 300 is eligible to be 'dropped', i.e. discarded, if congestion occurs in ATM network 102 and the cell cannot be processed ...", [0043] lines 7-13). Also, Kuhl disclosed "Quality of Service for a MPLS connection interfacing to an ATM network", [0091], wherein, see [0092], MPLS frame is receive with a label 318, shown in fig. 3, containing an embedded "EXP field 322" value, which is then mapped to an "internal cell" having an appropriate CoS value, which in turn is mapped to an ATM CLP value.

Therefore, per Kuhl's above teaching of embedding "CLP" in "ATM cells" for ATM → MPLS mapping and embedding "EXP" in "MPLS frames" for MPLS → ATM mapping, it would have been obvious to and easily thought of by one skilled in the art at the time

of the instant invention to, as a design alternative, embed "service category" of *CoS information* in the ATM cell in order to provide a more dynamic QoS management method that offers cell/packet-by-cell/packet QoS mapping without being restricted to only connection-by-connection mapping.

In fact, on the other hand, having a data packet or cell to explicitly *contain* full featured *class of service information* is an old and conventionally well-known technique. For example, the Applicant admits (Specification of present application, page 2, first paragraph), "Example of CoS information used by conventional protocols includes IP Type of Service (ToS), MPLS experimental (EXP) bits, VLAN user priority, and IPv6 traffic class. Typically, CoS information is encoded within the header information associated with each packet". Yet another example can be seen in Raychaudhuri wherein ATM service category indicators are embedded in ATM cells.

Raychaudhuri discloses "data link control protocols for wireless ATM access channels" (title) that "provides integrated ATM service including available bit-rate (ABR) data and constant/variable bit-rate (CBR/VBR) voice or video through the addition of wireless-specific medium access control and data link control [DLC – Examiner denotes] protocol" (Abstract lines 3-6), which "may be incorporated into a standard ATM protocol" (col. 2 line 59). Raychaudhuri's invention comprises:

Regarding claims 1, 15, 16, 29 and 34, *receiving/receive packet containing a first class of service (CoS) information* embedded the packet (refer to fig. 3A showing a "typical wireless ATM cell", col. 3 line 65, having a "wireless link header 48" and see "this header also include fields to enable other wireless network functions such as

service type definition 52", col. 5 lines 34-36, which "service type definition", as well known in the art, comprises above cited ATM "ABR/CBR/VBR" etc., just the same as Kuhl's "service category" shown in fig. 5 therein).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the present invention to also further modify Kuhl by adding Raychaudhuri's explicit teachings of embedding ATM "service type definition" into ATM cells in order to provide an enhanced system that is able "to enable other wireless network functions" (Raychaudhuri, col. 5 line 35-36) and further to provide "an integral part of a high-speed ATM network with unified wired and wireless services via standard ATM network and signaling/control layers, augmented to support mobility" (Raychaudhuri, col. 1 lines 48-51).

(It is **important to note** that Kuhl in view of Raychaudhuri will be able to perform a full featured "class of service" mapping on per-cell instead of per-connection basis. Kuhl in view of Raychaudhuri will receive ATM cells with embedded "service type definition" bits, added by Raychaudhuri, which is the same as Kuhl's "service class/category 502", in an ingress "ATM cell 300/620" header, use "mapping 600" policy or table 500 in fig. 5 to map the ATM "service class/category 502" (fig. 5) to internal "class of service 508" (fig. 5), then use "mapping 614" policy or table 700 in fig. 7 to map corresponding internal "class of service 702" (fig. 7), which is the same as "class of service 508" of fig. 5, in conjunction with "CLP = 0/1" values, to various different MPLS "EXP values" ranging from 0 to 7 as shown in columns 704/706 of fig. 7. This sets the context and background for the discussion below regarding various Dependent claims).

- **With respect to Dependent claims**

Kuhl with the addition of Callon and Raychaudhuri discloses:

Regarding claim 2, *wherein mapping the first CoS information* (ATM "service category" → internal "class of service") *comprises applying a first policy* (Kuhl, fig. 5) *to map the first CoS information to the intermediate CoS information* (Kuhl, "fig. 5 is a table of an exemplary mapping of ATM Quality of Service parameters to a class of service in

the AT/MPLS edge switch of fig. 1", [0023], which "QoS parameters" comprise "ATM service category", [0047] last two lines); *and*

wherein mapping the intermediate CoS information (internal "class of service" → MPLS "EXP value/field") *comprises applying a second policy* (Kuhl, fig. 7) *to map the intermediate CoS information* (Kuhl, "class of service" of fig. 7) *to the second CoS information* ("fig. 7 is a table of an exemplary mapping of class of service and drop precedence of a cell to a value for the EXP field in a MPLS frame in the A/M of fig. 1", [0025]).

Regarding claims 3 and 17, *wherein the first policy* (Kuhl, fig. 5) *comprises a protocol-specific policy in accordance with the first network protocol* (Kuhl, fig. 5 depicting *an* ATM *protocol-specific policy* because the mapping thereof is "ATM Quality of Service parameters to a class of service in the A/M of fig. 1", [0023]), *and*

wherein the second policy (Kuhl, fig. 7) *comprises a protocol-specific policy in accordance with the second network protocol* (Kuhl, fig. 7 depicting *an* MPLS *protocol-specific policy* because the mapping thereof is "class of service and drop precedence of a cell to a value for the EXP field in a MPLS frame in the A/M of fig. 1", [0025]).

Regarding claims 4 and 18, *presenting a user interface to receive input; and configuring the second policy* (fig. 7 table 700) *based on the input* ("the mapping of table 700 is configurable by the user", [0071] lines 9-10, which requires *a user interface* as can be appreciated by one skilled in the art. Noting that although Kuhl does not explicitly states that fig. 5 table 500, denoting *the first policy*, can be user-configurable, it would have been obvious to one skilled in the art at the time of the invention to modify Kuhl by

doing for table 500 the same as that for table 700, denoting *the second polity*, in order to provide more flexibility in user control over the CoS mapping in the edge switch considering the fact that a complete user control enables the user to adjust to any special circumstances wherein special class of services conversion is desired, as being often the case well known in the art).

Regarding claim 5, *wherein receiving a packet* (Kuhl, fig. 6 "ATM cell 620") *comprises receiving the packet with a first interface* (Kuhl, fig. 6 "ATM card 200") *of a network device* (Kuhl Kuhl, fig. 6 "A/M 122"); *and*

wherein forwarding the packet (Kuhl, fig. 6 "MPLS frame 630") *comprises forwarding the packet with a second interface* (Kuhl, fig. 6 "MPLS card 204") *of the network device* (Kuhl, fig. 6 "A/M 122").

Regarding claims 6/19, *wherein the first interface is associated with a first interface card* (Kuhl, fig. 6 "ATM card 200") *of a network router* (Kuhl, fig. 6 "A/M 122"), *and the second interface is associated with a second interface card* (Kuhl, fig. 6 "MPLS card 204") *of the network router.*

Regarding claim 7, *updating, with the first interface, data included within the packet* (Kuhl, fig. 5 "service category 502" which would be Raychaudhuri's ATM "service type definition" embedded in an ATM cell) *to include the intermediate CoS information* (Kuhl, fig. 5 showing "service category 502" *updated to include* internal "class of service 508"); *and*

communicating the packet and the intermediate CoS information from the first interface to the second interface (Kuhl, fig. 7 depicting "class of service 702", which is

the same as "class of service 508" of fig. 5, being *communicated to* the "MPLS card 204" wherein "a mapping of class of service levels and drop precedence values to values for EXP field" is performed, [0070] last three lines).

Regarding claim 8, *wherein updating the data included within the packet comprises adding a header to the data of the packet that specifies the intermediate CoS information* (Kuhl, fig. 6 "internal cell 650" with *added* "internal header 656, connection identifier field 658, header 654 and CLP bit 652", [0065] lines 10-11, which "CLP bit 652" would become ATM "service class bits" with the addition of Raychaudhuri and now integrated into "class of service 508" in accordance with fig. 5 table 500).

Regarding claim 9, *wherein forwarding the packet comprises: removing the intermediate CoS information from the data of the packet with the second interface; updating the data of the packet to include the second CoS information; and forwarding the packet with the second CoS information with the second interface* (Kuhl, "in the second stage of providing the appropriate value for EXP field 632 for transmission across E-LSPs, MPLS card 240 of A/M 122 maps the class of service for the connection and the drop precedence value of each internal cell 650 to a value for EXP field 632", [0070] lines 1-5, and particularly "internal header 656, connection identifier field 658, header 654 and CP bit 652m us received by MPLS card 204, its contents are transposed and MPLS frame 630, with outer label 634 and EXP filed 632, and it is transmitted from MPLS card 240", [0065] last 5 lines, for example, "an internal cell 650 with class of service 7 (row 722, column 704) will have the value 6, '110' in binary, inserted into EXP field 632 of the MPLS frame 630", [0071] lines 5-9).

Regarding claims 10 and 22, *wherein the intermediate CoS information* (Kuhl, "class of service 508/702" of figs. 5/7) *comprises protocol-independent metadata associated with the packet* (said internal "class of service 508/702" is shown to *comprise protocol-independent metadata* of 1-8 levels).

Regarding claims 11, 23 and 33, *wherein the first CoS information and the second CoS information each comprise one of Internet Protocol (IP) Type of Service (ToS) information, Multiprotocol Label Switching (MPLS) experimental (EXP) bits, virtual Local Area Netowork (VLAN) user priority information, and Internet Protocol version 6 (IPv6) traffic class information* (Kuhl, "MPLS card 204 inserts the appropriate value into EXP field 632 of each outgoing MPLS frame 630", [0070] lines 6-7, noting that Kuhl's A/M is bidirectional, i.e., "direction 240" and "direction 246" in fig. 2, which means that said "EXP field" can be of either *the first CoS information* in "direction 246" or *the second CoS information* in "direction 240").

Regarding claim 12, *wherein receiving a packet comprises receiving the packet with a router* (Kuhl, fig. 6 "A/M 122") *and wherein forwarding the packet comprises forwarding the packet with the router* (Kuhl, fig. 6 the same "A/M 122").

Regarding claim 13, *wherein forwarding the packet comprises forwarding the packet with a centralized forwarding engine of the router* (Kuhl, fig. 6 "control complex 214" which "maps the ATM QoS parameters to the class of service using mapping 600. The information can then be sent to MPLS card 204", [0068] lines 7-9, and then "card 204" *forwards*, under the control of complex 214, MPLS frames as shown in fig. 6).

Regarding claim 14, *wherein forwarding the packet comprises forwarding the packet with a forwarding component within an interface card of the router* (Kuhl, fig. 6 depicting forwarding MPLS frame by "MPLS card 204" which will have to have a sending or *forwarding component* therein).

Regarding claim 16, *wherein the first interface* (Kuhl, fig. 6 "ATM card 200") *applies a first policy* (Kuhl, fig. 6 "mapping 600") *to map the first CoS information* (Kuhl, fig. 5 ATM "service category 502" which would be, with the addition of Raychaudhuri, ATM "service type definition" embedded in an ATM cell header) *to the intermediate CoS information* (Kuhl, figs. 5/7 "class of service 508/702"); *and*

wherein the second interface (Kuhl, fig. 6 "MPLS card 204") *applies a second policy* (Kuhl, fig. 6 "mapping 614" of fig. 7 which shows the details) *to map the intermediate CoS information* (Kuhl, fig. 7 "class of service 702") *to the second CoS information* (Kuhl, fig. 7 "EXP field" 704/706 per "CLP = 0/1").

Regarding claim 20, *wherein the first interface updates the data of the packet* (Kuhl, fig. 6 "CLP bit 622", which would be, with the addition of Raychaudhuri, ATM "service class definition" embedded in ATM cell header) *by adding the intermediate CoS information to the data of the packet* (Kuhl, fig. 5 showing "service category 502" *updated to include* internal "class of service 508"), *and communicates the updated packet having the intermediate CoS information to the second interface* (Kuhl, "control complex 214 maps the ATM QoS parameters to the class of service using mapping 600. The information can then be sent to MPLS card 240", [0068] lines 7-9).

Regarding claim 21, *the second interface* (Kuhl, fig. 6 "MPLS card 204") *removes the intermediate CoS information from the packet, and updates the data of the packet by adding the second CoS information to the packet* (Kuhl, "in the second stage of providing the appropriate value for EXP field 632 for transmission across E-LSPs, MPLS card 240 of A/M 122 maps the class of service for the connection and the drop precedence value of each internal cell 650 to a value for EXP field 632", [0070] lines 1-5, and particularly "internal header 656, connection identifier field 658, header 654 and CP bit 652m us received by MPLS card 204, its contents are transposed and MPLS frame 630, with outer label 634 and EXP filed 632, and it is transmitted from MPLS card 240", [0065] last 5 lines, for example, "an internal cell 650 with class of service 7 (row 722, column 704) will have the value 6, '110' in binary, inserted into EXP field 632 of the MPLS frame 630", [0071] lines 5-9).

Regarding claim 25, *wherein the first interface is associated with a first interface card* (Kuhl, fig. 6 "ATM card 200"), *and the second interface is associated with a second interface card* (Kuhl, fig. 6 "MPLS card 204").

Regarding claim 27, *wherein the network device* (Kuhl, fig. 6 "A/M 122") applies policies (Kuhl, fig. 6 "mapping 600" of fig. 5 having the details thereof) *to map the first CoS information* (Kuhl, fig. 5 "service category 502", which would become, with the addition of Raychaudhuri, embedded in ATM cell header) *to the intermediate CoS information* (fig. 5 showing ATM "service category 502" mapped to "class of service 508") *and to map the intermediate CoS information to the second CoS information*

(Kuhl, fig. 7 showing "class of service 702", which is the same as "class of service 508" in fig. 5, mapped to "EXP field" 704/706 per "CLP = 0/1").

Regarding claim 28, *wherein the network device comprises a router* (Kuhl, "A/M 122" cited for claim 26 above).

Regarding claim 30, *wherein the computer program further comprises instructions to cause the processor* (Kuhl, "control complex 214" of fig. 6) *to apply a policy* (Kuhl, "mapping 600" of fig. 6 which "is that provided in table 500 of fig. 5", [0066] lines 6-7) *to the packet* (Kuhl, fig. 6 "ATM cell 620") *to generate the intermediate CoS information from the first CoS information* (Kuhl, see fig. 5 showing how internal "class of service 508" at different levels is *generated from the first CoS information*, i.e., corresponding ATM "service category 502", which, with the addition of Raychaudhuri, would be ATM "service class definition" embedded in ATM cell header).

Regarding claim 31, *wherein the policy* (Kuhl, fig. 6 "mapping 600" or fig. 5 showing details thereof) *comprises a protocol-specific policy in accordance with the first network protocol* (Kuhl, the policy "provided in table 500 of fig. 5" is *in accordance with the first network protocol*, i.e., ATM *network protocol*).

Regarding claim 32, *wherein the intermediate CoS information* (Kuhl, figs. 5/7 "class of service 508/702") *comprises protocol-independent metadata associated with the packet* (note that "class of service 508/702" *comprises* ATM/MPLS *protocol-independent metadata* of levels 1-8 *associated with the* internal cell 650 of fig. 6, which is mapped from ingress ATM "message 606").

Regarding claim 35, *wherein processing the packet comprises to apply the one of the plurality of policies* (Kuhl, "mapping 600" and "mapping 614") *comprises applying a first one of the plurality of policies* (Kuhl, "mapping 600" of fig. 6 which "is that provided in table 500 of fig. 5", [0066] lines 6-7) *to the packet* (Kuhl, "ATM cell 620" of fig. 6) *to map the packet to the protocol-independent CoS information* (fig. 5 shows how ATM "service category 502", which would become, with the addition of Raychaudhuri, ATM "service class definition" embedded in ATM cell header, is *mapped to the protocol-independent CoS information*, i.e., "class of service 508"), *wherein the first policy is specific to a first one of the at least three network protocols* (Kuhl, the policy "provided in table 500 of fig. 5" is *specific to a first network protocol*, i.e., ATM, which is one of *the at least* two *network protocols*, and), *and*

wherein subsequently processing the packet comprises mapping the protocol-independent CoS information (Kuhl, fig. 7, "class of service 702" which is the same as internal "class of service 508" of fig. 8) *to a second one of the plurality of policies* (Kuhl, "mapping 614" of fig. 6 and see fig. 7 showing how "mapping 614" maps "class of service 702" to MPLS "EXP field" 704/706 depending on CLP = 0/1) *that is specific to a second one of the at least three network protocols* (Kuhl, "EXP field" is *specific to* MPLS, *one of the at least* two *network protocols*, and Callon disclosing *supporting at least three network protocols* comprising "OSI", "P3" and "IP" protocols supported by "three P3-IP-OSI router 322", fig. 7B), *and applying the second policy to the packet* (Kuhl, fig. 6 egress "MPLS frame 630" having "EXP field 632" *applied* thereto after *applying* "mapping 614").

Regarding claim 36, *wherein applying the first policy* (Kuhl, fig. 6 "mapping 600" or fig. 5 showing details thereof) *comprises applying the first policy to first header information of the packet* (Kuhl, fig. 6 showing "mapping 600" being *applied to* "header 624" of ATM "cell 620", which becomes "header 652" of the "internal cell 650" afterwards), *wherein the first header information conforms to the first network protocol* (Kuhl, "header 624" must *conform to the first network protocol*, i.e., ATM), *and*

wherein applying the second policy (Kuhl, fig. 6 "mapping 614" or fig. 7 showing details thereof) *comprises applying the second policy to second header information of the packet* (Kuhl, fig. 6 "header 654" of "internal cell 650", which becomes "header 634" having "EXP field 632" of egress "MPLS frame" after applying *the second policy* of fig. 7, which is "mapping 614" of fig. 6), *wherein the second header information conforms to the second network protocol* (Kuhl, "EXP field" must *conform to the second network protocol*, i.e., MPLS).

Regarding claim 37, *storing the protocol-independent CoS information* (Kuhl, figs. 5/7 "class of service 508/702" as part of "mapping 600/614" policy of fig. 6) *as the metadata* (figs. 5/7 showing 8 different levels, as *metadata*, for "class of service 508/702") *within a memory of the network device* ("A/M 122", and see "Prior to establishing connections through A/M 122, a mapping 600 of ATM QoS parameters to [internal] class of service values is provided to control complex 214 of A/M 122", [0066] lines 1-4, which "mapping 600" obviously must be *stored* since it was provided "prior to establishing connection". The same is stated regarding "mapping 614", [0072]); *and*

associating the metadata with the packet throughout an entire packet-processing path of the network device (see figs. 5 and 7, both denoting *the metadata* comprise "class of service" wherein fig. 5 is *associated with the packet* as ingress ATM cell while fig. 7 *associated with the packet* as egress MPLS frame, that is that the *metadata* is *associated with the packet throughout an entire packet-processing path of the network device* starting from the ingress ATM cell and ending with the egress MPLS frame).

Regarding claim 39, *configuring* second (Kuhl, "mapping 614" of fig. 6 or table 700 of fig. 7) *of the plurality of policies* (Kuhl, having another, first, *policy* of "mapping 600" of fig. 6 or table 500 of fig. 5) *in accordance with input received from a user via a user interface* (Kuhl, "a terminal (not shown) is connected to control complex 214 in ATM/MPLS edge switch 122. A user communicates with control complex 214 through the terminal to customize the above mapping", [0088] lines 3-6) *such that the universal classification mechanism is fully customizable* (Kuhl, "customizing mapping of class of service and drop precedence to EXP value", [0087], noting that although Kuhl does not explicitly states that fig. 5 table 500, denoting *the first policy*, can be user-configurable, it would have been obvious to one skilled in the art at the time of the invention to modify Kuhl by doing the same for table 500 as that for table 700, denoting *the second polity*, in order to provide more flexibility in user control over the CoS mapping in the edge switch considering the fact that a complete user control enables the user to adjust to any special circumstances wherein special class of services conversion is desired, as being often the case well known in the art).

3. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuhl in view of Callon and Raychaudhuri, and further in view of Hughes et al (US 6,434,612, Hughes hereinafter).

Kuhl in view of Callon and Raychaudhuri discloses claimed limitations as described in section 2 above icluding:

Regarding claim 24, *wherein the first interface with the first protocol* (Kuhl, fig. 6 "ATM card 200" with ATM protocol), *and second interface with the second protocol* (Kuhl, fig. 6 "MPLS card 204" with MPLS protocol).

Kuhl in view of Callon and Raychaudhuri does not expressly disclose that said firs/second interfaces each *comprises a logical interface.*

Hughes discloses "a connection control interface for switches in a network" (Abstract line 1) using a "multiple VSI controller (fig. 7) comprising:

Regarding claim 24, an interface *comprises a logical interface* (some "controllers may control all interfaces because each controller is presented a view of a switch having a particular set of logical interfaces. The logical interfaces are either physical interfaces or virtual interfaces, and the set of logical interfaces presented to different controllers will differ", col. 7 lines 15-20).

It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the system of Kuhl by adding the logical interface configuration of Hughes to K1 in order to provide a better connection mechanism to overcome prior art problem wherein "prior art connection protocols do not support distributed processing thereby requiring connection control messages to be sent to a

single point on the associated switch," which "creates a bottleneck in communications" and "complicate the task of managing and controlling a network switch and limit the flexibility and performance scalability of the network" (Hughes, col. 3 lines 16-22).

Response to Arguments

4. Applicant's arguments with respect to claims 1, 15, 26, 29, 34 and 35 on the limitation of (*support/supporting*) at *least three network protocols* have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues (Remarks page 14 first paragraph), "the applied references lack any teaching to suggest a network device that support at least three network protocols, as required by Applicant's currently amended claim 1" (emphasis added, and it is noted that claims 15, 26, 29, 34 and 35 have similar limitation).

As discussed in sections 2 above, Callon expressly disclosed the feature via an example of "three [protocol] P3-IP-OSI router 322" (fig. 7B) supporting "P3", "IP" and OSI" network protocols, which is, to one skilled in the art, an obvious and natural enhancement to Kuhl who expressly disclosed *supporting at least* two *network protocols*, and in fact provided indirect suggestion for *three* protocols via "ATM/MPLS" and "ATM/IP" edge switches. Therefore Callon renders Applicant's argument in this regard moot.

5. Applicant's arguments filed 11/23/2008 over the issue of the details of *CoS mapping* between network protocols have been fully considered but they are not persuasive.

Firstly, Applicant argues (Remarks page 12 second paragraph), "the Kuhl reference maps ***physical connections*** over which packets (or more particularly, ATM cells) travel through the network to an intermediated class of service, instead of mapping the first CoS information to the intermediate CoS information based on the class of service ***determined fro the packet***" (emphasis original).

Examiner respectfully disagrees.

As Applicant admitted above, each "physical connection" carries "ATM cells", and as well known in the art, each ATM "connection" is associated with a certain class of service (CoS), such as the well known CBR/VBR/ABR etc. which are also explicitly used in Kuhl in the name of "service category". Therefore, the "CoS" of a "connection" that carries certain "ATM cells" is "the class of service ***determined for the*** **ATM cell or** ***packet***".

Secondly, Applicant argues (page 12 second paragraph also), "Kuhl lacks any teaching to suggest accessing the first CoS information within the packet to determine the class of service for the packet, and mapping the first CoS information to the intermediate CoS information based on the class of service determined for the packet" (emphasis original).

It is true that Kuhl does not obtain the *first CoS information* ("service category") from *within the packet*, instead, Kuhl obtains it, as discussed in section 2 above, via a another packet, the "connection request message 606" (fig. 6), which provides the *first CoS information* for ATM cells to be carried over their connection. Examiner previously as well as presently acknowledged the difference of Kuhl from the Applicant in that the Applicant obtains the *first CoS information* from *within* the received *packet*. However, Examiner previously, as well as presently, pointed out that to have an incoming packet

(ATM cell in Kuhl) to have embedded therein the CoS information for the packet is simply an obvious alternative and/or addition, in view of any one of three factors, all presented to the Applicant but Examiner would like to elaborate further below:

A. In view of Kuhl himself. Examiner pointed out Kuhl has teachings of embedded "CLP bits" in ATM cells, which "CLP" is used as a partial CoS indicator to mapping it to an "EXP value" in MPLS frames. In other words, Kuhl has already taught the technique of having CoS, at least partially, *within the packet* to be received. It would only have been obvious to one skilled in the art to use it to embed a full featured "service category" in the ATM cell. Additionally, Examiner pointed out Kuhl's MPLS-to-ATM mapping wherein "EXP value" is expressly taught to be embedded in MPLS frame and used to eventually generate ATM "CLP bits". This mapping in reversed direction also clearly shows that Kuhl has the teaching of embedding *within the packet* the CoS information, and one skilled in the art can obviously use such teaching as well for embedding full featured "service category" for ATM cells.

B. In view of Applicant admitted art. Examiner pointed out, previously as well as presently, Applicant admitted that prior arts had already taught (Specification of present application, page 2, first paragraph), "Example of CoS information used by conventional protocols includes IP Type of Service (ToS), MPLS experimental (EXP) bits, VLAN user priority, and IPv6 traffic class. Typically, CoS information is encoded within the header information associated with each packet". This would also make it obvious to one skilled in the art to modify Kuhl to have CoS embedded "within the header information associated with each packet".

C. More specifically in view of other prior art teachings. Examiner previously referred Applicant to Kilkki, and presently to Raychaudhuri, for particular teachings of embedding ATM CoS information in ATM cells. On the one hand, Kilkki expressly teaches "the CLP bit in the cell header may be used to discern between real-time and non-real-time payload" (col. 7 lines 40-42) and if CLP bit is not enough, "other header bits may be redefined to represent cell priority level and service class designations" (col. 8 lines 30-310). On the other hand, Raychaudhuri expressly teaches *within* ATM cell header, "also includes fields to enable other wireless network functions such as service type definition 52" (col. 5 lines 34-36 and fig. 3B), which is "CBR/VBR/ABR" (that Kuhl uses for specifying ATM cells CoS but would obtain via a "connection request" packet). These teaching shows, once again, that it would only have been obvious to one skilled in the art to at the time of the present invention to modify Kuhl by adding embedding CoS information into ATM cells, and Examiner presented, previously as well as presently, the benefits and motivations for doing so. It should be pointed that although Examiner presently applied Raychaudhuri, instead of previously applied Kilkki, it should not be construed as Kilkki failed to render Applicant's claimed limitation obvious. It is only that Examiner deems Raychaudhuri provided more details than Kilkki and Examiner reserves the right to refer back to Kilkki in the future, if needed.

With above said, Examiner considers that he has addressed the arguments Applicant presented on page 13, paragraphs 2 and 3, and thus there is no need to repeat the same to address essentially the same issue but only worded differently thereof.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDREW LAI whose telephone number is (571)272-9741. The examiner can normally be reached on M-F 7:30-5:00 EST, Off alternative Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang Yao can be reached on 571-272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Andrew Lai/
Examiner, Art Unit 2416

/Kwang B. Yao/
Supervisory Patent Examiner, Art Unit 2416